

YOUNG NAM METAL TYPE APPROVAL TEST REPORT

TEST DATE :

November 19, 2013 ~ April 03, 2014

TEST STANDARD :

IACS Req. 2001/Rev.3 2012

(UR P2.11.5.5.1 ~ UR P2.11.5.5.8)



YOUNG NAM METAL CO., LTD

TOTAL TEST REPORTS
ENDORSED by LR & BV
of ALL TYPE TESTED



YOUNG NAM METAL CO., LTD

VIBRATION TEST REPORT

1. TEST DATE : 2014년 01월 07일
2. TEST PLACE : GNTB(GYEONGNAM TECHNOPARK)
3. TEST SIZE : GR-S 40A
4. TEST RULE : IACS Req. 2001/Rev.3 2012

Number of cycle	Amplitude, mm	Frequency, Hz
3×10^6	± 0.06	100
3×10^6	± 0.5	45
3×10^6	± 1.5	10

5. TEST RESULT

VIBRATION			pressure		Remark
cycle	Amplitude	Frequency	preservation pressure	Result	
3×10^6	± 0.06	100	20kgf/cm ²		
3×10^6	± 0.5	45	20kgf/cm ²		
3×10^6	± 1.5	10	20kgf/cm ²		

YOUNG NAM METAL CO.LTD.

[Signature]
CHIEF INSPECTOR, QC/QA DEPT.



VIBRATION TEST REPORT

1. TEST DATE : 2014년 11월 07 일
2. TEST PLACE : GNTB(GYEONGNAM TECHNOPARK)
3. TEST SIZE : GR-L 40A
4. TEST RULE : IACS Req. 2001/Rev.3 2012

Number of cycle	Amplitude, mm	Frequency, Hz
3×10^6	± 0.06	100
3×10^6	± 0.5	45
3×10^6	± 1.5	10

5. TEST RESULT

VIBRATION			pressure		Remark
cycle	Amplitude	Frequency	preservation pressure	Result	
3×10^6	± 0.06	100	20kgf/cm ²		
3×10^6	± 0.5	45	20kgf/cm ²		
3×10^6	± 1.5	10	20kgf/cm ²		

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Young Nam Metal Co., Ltd



SURVEYOR

VIBRATION TEST REPORT

1. TEST DATE : 2014년 이월 07 일
2. TEST PLACE : GNTB(GYEONGNAM TECHNOPARK)
3. TEST SIZE : GR-S 100A
4. TEST RULE : IACS Req. 2001/Rev.3 2012

Number of cycle	Amplitude, mm	Frequency, Hz
3×10^6	± 0.06	100
3×10^6	± 0.5	45
3×10^6	± 1.5	10

5. TEST RESULT

VIBRATION			pressure		Remark
cycle	Amplitude	Frequency	preservation pressure	Result	
3×10^6	± 0.06	100	16kgf/cm ²		
3×10^6	± 0.5	45	16kgf/cm ²		
3×10^6	± 1.5	10	16kgf/cm ²		

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Young Nam Metal Co., Ltd



SURVEYOR

VIBRATION TEST REPORT

1. TEST DATE : 2014년 01월 01일
2. TEST PLACE : GNTB(GYEONGNAM TECHNOPARK)
3. TEST SIZE : GR-L 100A
4. TEST RULE : IACS Req. 2001/Rev.3 2012

Number of cycle	Amplitude, mm	Frequency, Hz
3×10^6	± 0.06	100
3×10^6	± 0.5	45
3×10^6	± 1.5	10

5. TEST RESULT

VIBRATION			pressure		Remark
cycle	Amplitude	Frequency	preservation pressure	Result	
3×10^6	± 0.06	100	16kgf/cm ²		
3×10^6	± 0.5	45	16kgf/cm ²		
3×10^6	± 1.5	10	16kgf/cm ²		

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SURVEYOR

VIBRATION TEST REPORT

1. TEST DATE : 2014년 01월 01 일
2. TEST PLACE : GNTB(GYEONGNAM TECHNOPARK)
3. TEST SIZE : GR-L 200A
4. TEST RULE : IACS Req. 2001/Rev.3 2012

Number of cycle	Amplitude, mm	Frequency, Hz
3×10^6	± 0.06	100
3×10^6	± 0.5	45
3×10^6	± 1.5	10

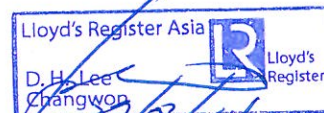
5. TEST RESULT

VIBRATION			pressure		Remark
cycle	Amplitude	Frequency	preservation pressure	Result	
3×10^6	± 0.06	100	12kgf/cm ²		
3×10^6	± 0.5	45	12kgf/cm ²		
3×10^6	± 1.5	10	12kgf/cm ²		

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SURVEYOR

VIBRATION TEST REPORT

1. TEST DATE : 2014년 이월 07 일
2. TEST PLACE : GNTB(GYEONGNAM TECHNOPARK)
3. TEST SIZE : GR-S 200A
4. TEST RULE : IACS Req. 2001/Rev.3 2012

Number of cycle	Amplitude, mm	Frequency, Hz
3×10^6	± 0.06	100
3×10^6	± 0.5	45
3×10^6	± 1.5	10

5. TEST RESULT

VIBRATION			pressure		Remark
cycle	Amplitude	Frequency	preservation pressure	Result	
3×10^6	± 0.06	100	12kgf/cm ²		
3×10^6	± 0.5	45	12kgf/cm ²		
3×10^6	± 1.5	10	12kgf/cm ²		

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SURVEYOR

Test Report (Tightening Test)

Purpose		Type Approval Test				
Classification Society						
Original Certification No.						
Date		2013. 11. 19				
TYPE & SIZE	Max Working Pressure(bar)	Tightening Pressure(bar)	Test Pressure(bar)	Holding Time (min)	Result	Remark
GR-S 40A	20	30	30	5 min		
GR-L 40A	20	30	30	5 min		
GR-S 100A	16	24	24	5 min		
GR-L 100A	16	24	24	5 min		
GR-S 200A	12	18	18	5 min		
GR-L 200A	12	18	18	5 min		
MF-RS 40A	20	30	30	5 min		
MF-RL 40A	20	30	30	5 min		
MF-RS 100A	16	24	24	5 min		
MF-RL 100A	16	24	24	5 min		
MF-RS 200A	12	18	18	5 min		
MF-RL 200A	12	18	18	5 min		
Remark						
<p>YOUNG NAM METAL CO.LTD.</p> <p><i>[Signature]</i></p> <p>CHIEF INSPECTOR, QC/QA DEPT.</p> <p>Young Nam Metal Co., Ltd</p>						
<p>Lloyd's Register Asia</p> <p>Y. S. Kim</p> <p>Busan Port Office</p> <p>SURVEYOR</p>						

Test Report (Burst Pressure)

Purpose		Type Approval Test				
Classification Society						
Original Certification No.						
Date		2013. 11. 19				
TYPE & SIZE	Max Working Pressure(bar)	Burst Pressure(bar)	Test Pressure(bar)	Holding Time (min)	Result	Remark
GR-S 40A	20	80	80	5 min		
GR-L 40A	20	80	80	5 min		
GR-S 100A	16	64	64	5 min		
GR-L 100A	16	64	64	5 min		
GR-S 200A	12	48	48	5 min		
GR-L 200A	12	48	48	5 min		
MF-RS 40A	20	80	80	5 min		
MF-RL 40A	20	80	80	5 min		
MF-RS 100A	16	64	64	5 min		
MF-RL 100A	16	64	64	5 min		
MF-RS 200A	12	48	48	5 min		
MF-RL 200A	12	48	48	5 min		
Remark						
<p>YOUNG NAM METAL CO.LTD.</p> <p><i>[Signature]</i></p> <p>CHIEF INSPECTOR, QC/QA DEPT.</p> <p>Young Nam Metal Co., Ltd</p>						
<p>Lloyd's Register Asia</p> <p>Y. S. Kim</p> <p>Busan Port Office</p> <p><i>[Signature]</i></p> <p>SURVEYOR</p>						

Test Report (Vacuum Test)

Purpose		Type Approval Test			
Classification Society					
Original Certification No.					
Date		2013. 11, 20			
TYPE & SIZE	Vacuum Pressure(mbar)	Test Pressure(mbar)	Holding Time (min)	Result	Remark
GR-S 40A	300mbar	300	15 min		
GR-L 40A	300mbar	300	15 min		
GR-S 100A	300mbar	300	15 min		
GR-L 100A	300mbar	300	15 min		
GR-S 200A	300mbar	300	15 min		
GR-L 200A	300mbar	300	15 min		
MF-RS 40A	300mbar	300	15 min		
MF-RL 40A	300mbar	300	15 min		
MF-RS 100A	300mbar	300	15 min		
MF-RL 100A	300mbar	300	15 min		
MF-RS 200A	300mbar	300	15 min		
MF-RL 200A	300mbar	300	15 min		
Remark					
<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="text-align: left;"> <p>YOUNG NAM METAL CO.LTD.</p> <p><i>Y.N.M.</i></p> <p>CHIEF INSPECTOR, QC/QA DEPT.</p> <hr/> <p>Young Nam Metal Co., Ltd</p> </div> <div style="text-align: right;"> <p>Lloyd's Register Asia</p> <p>Y. S. Kim</p> <p>Busan Port Office</p> <p>SURVEYOR</p> </div> </div>					

Test Report (REPEATES ASSEMBLY TEST)

Purpose		Type Approval Test				
Classification Society						
Original Certification No.						
Date		2013. 11. 19				
TYPE & SIZE	Standard (Times)	Test (Times)	Max Working Pressure(bar)	Test Pressure(bar)	Result	Remark
GR-S 40A	10	10	20	30		
GR-L 40A	10	10	20	30		
GR-S 100A	10	10	16	24		
GR-L 100A	10	10	16	24		
GR-S 200A	10	10	12	18		
GR-L 200A	10	10	12	18		
Remark						
<p>YOUNG NAM METAL CO.LTD.</p> <p><i>[Signature]</i></p> <p>CHIEF INSPECTOR, QC/QA DEPT.</p> <p>Young Nam Metal Co., Ltd</p>						
<p>Lloyd's Register Asia</p> <p>Y. S. Kim</p> <p>Busan Port Office</p> <p><i>[Signature]</i></p> <p>Lloyd's Register</p> <p>SURVEYOR</p>						

Test Report (PULL-OUT TEST)

Purpose		Type Approval Test				
Classification Society						
Original Certification No.						
Date		2013, 11, 28				
TYPE & SIZE	Max Working Pressure(bar)	Standard Load(Newton)	TEST Load	Holding Time (min)	Result	Remark
GR-S 40A	20	37,101	39,200 (0.4ton)	5 min		
GR-L 40A	20	37,101	39,200 (0.4ton)	5 min		
GR-S 100A	16	164,173	166,600 (1.7ton)	5 min		
GR-L 100A	16	164,173	166,600 (1.7ton)	5 min		
GR-S 200A	12	440,944	441,000 (4.5ton)	5 min		
GR-L 200A	12	440,944	441,000 (4.5ton)	5 min		
Remark						
<p>YOUNG NAM METAL CO.LTD.</p> <p><i>[Signature]</i></p> <p>CHIEF INSPECTOR, QC/QA DEPT.</p> <p>Young Nam Metal Co., Ltd</p>						
<p>Lloyd's Register Asia Y.S.Kim Busan Port office Register 28.11.2013 SURVEYOR</p>						

Test Report (FIRE ENDURANCE TEST)

Purpose		Type Approval Test				
Classification Society						
Original Certification No.						
Date		2013. 12. 11				
TYPE & SIZE	TEST TEMPERATURE (800°C ± 50°C)	Holding Time (min)	Max Working Pressure(bar)	Test Pressure(bar)	Result	Remark
GR-S 40A	800°C	30 min	20	40		EPDM
GR-L 40A	800°C	30 min	20	40		EPDM
GR-S 100A	800°C	30 min	16	32		EPDM
GR-L 100A	800°C	30 min	16	32		EPDM
GR-S 200A	800°C	30 min	12	24		EPDM
GR-L 200A	800°C	30 min	12	24		EPDM
MF-RS 40A	800°C	30 min	20	40		EPDM
MF-RL 40A	800°C	30 min	20	40		EPDM
MF-RS 100A	800°C	30 min	16	32		EPDM
MF-RL 100A	800°C	30 min	16	32		EPDM
MF-RS 200A	800°C	30 min	12	24		EPDM
MF-RL 200A	800°C	30 min	12	24		EPDM
Remark						
<p>YOUNG NAM METAL CO.LTD.</p> <p><i>[Signature]</i></p> <p>CHIEF INSPECTOR, QC/QA DEPT.</p> <p>Young Nam Metal Co., Ltd</p>						
<p>Lloyd's Register Asla</p> <p>Y. S. Kim</p> <p>Busan Port Office</p> <p><i>[Signature]</i></p> <p>Lloyd's Register</p> <p>SURVEYOR</p>						

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 - 6) Vacuum Test.
 - 7) Repeated assembly Test.
 - 8) Vibration Test.



YOUNG NAM METAL CO., LTD

1. Test Program



YOUNG NAM METAL CO., LTD

TEST PROGRAM
FOR
TYPE APPROVAL

(GRIP TYPE PIPE COUPLING : GR-S/ GR-L)

(MULTI FLEXE PIPE COUPLING : MF-RS/ MF-RL)

Test Standard : IACS Req. 2001/Rev.3 2012

Test Program for Mechanical Joints

1. General

Procedure and requirements for the follows tests are described in this section:

Tests	Types of mechanical joints	
	GRIP TYPE (GR TYPE)	SLIP TYPE (MF TYPE)
Tightness test.	0	0
Burst pressure test	0	0
Pull-out test.	0	-
Vibration test	0	-
Fire endurance test	0	0
Vacuum test.	0	0
Pressure pulsation test	0	-
Repeated assembly test	0	-

2. Tightness test. (Hydraulic pressure)

The test specimens shall be fitted to tubing according to the manufactures instunctiond.

The test pressure shall be at least 1.5 times working pressure.

Test pressure shall be kept constant in sufficient time to stabilize the system and to have the assemble checked for leakage.

Minimum holding time at test pressure is 5 min.

No visual signs of leakage is permitted.

3. Burst pressure test.

Burst pressure obtained in the testing sahill be at least 4 times maximum allowable working pressure.

The couplings may have small visible deformations when under calculated burst pressure, but no leakage or visible cracks are permitted.

The pressure shall be held at calculated burst pressure for at least 5 minutes.

4. Pull-out test.

4.1 Test assemble

A pipe of a size corresponding to the maximum size normally used together with coupling size to be tested, is to be fitted at each end of the coupling.

4.2 Procedure

The test assembly shall be pressurized to maximum allowable working pressure, and while under pressure it shall be subject to an axial load calculated according to the following formulae :

$$L = \pi/4 * D^2 * p$$

D = tube outside diameter.

p = maximum allowable working pressure in N/mm².

L = applied axial load in N

4.3 Requirements

No leakage, damage or relative movement between coupling and tube is permitted.

5. Vibration test

5.1 A test rig of cantilever type used for testing fatigue strength of components may be used. The test specimen being tested is to be arranged in the test rig as shown in Fig.2.

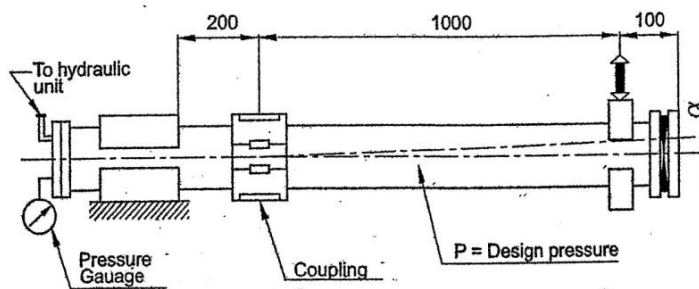


Fig. 2

5.2 Vibration amplitude

Two lengths of pipes are to be connected by means of joint assembly specimen to be tested. One end of the pipe is to be rigidly fixed while the other end is to be fitted to the vibrating element on the rig. The length of pipe connected to the fixed end should be kept as short as possible and in no case exceeds 200 mm.

Mechanical joint assemblies are not to be longitudinally restrained.

The assembly is to be filled with test fluid, de-aerated and pressurized to the design pressure of the joint. Preliminary angle of deflection of pipe axis is to be equal to the maximum angle of deflection, recommended by the manufacturer. The amplitude is to be measured at 1m distance from the center line of the joint assembly at free pipe end connected to the rotating element of the rig. (See Fig. 2)

Parameters of testing are to be as indicated below and to be carried out on the same assembly:

Pressure during the test is to be monitored. In the event of a drop in the pressure and visual signs of leakage the test is to be repeated as described in P2.11.5.4. Visual examination of the joint assembly is to be carried out for signs of damage which may eventually cause leakage.

5.3 Requirements

Number of cycle	Amplitude, mm	Frequency, Hz
3×10^6	± 0.06	100
3×10^6	± 0.5	45
3×10^6	± 1.5	10

6. Fire endurance test

In order to establish capability of the mechanical joints to withstand effects of which may be encountered in service, following fire test is to be carried out.

Mechanical joint assembly test specimen is to be subjected to fire for 30 min at a temperature of 800°C, while water at the design pressure of the joint is circulated inside. Specimen is to be completely engulfed in the flame envelop. The water temperature measured at the outlet of the test specimen is not to be less than 80°C during the test. After the fire testing, the specimen shall be subjected to a hydrostatic tightness test.

As an alternative, the fire test may be conducted with circulating water at a pressure of at least 5 bar lower than design pressure, proof pressure test to 2.0 times of design pressure.

6.1 If the fire test is conducted with circulating water at a pressure different from the design pressure of the joint (however of at least 5 bar) the subsequent pressure test is to be carried out to twice the design pressure.

Pressure and temperature during the test is to be monitored.

7. Vacuum test

In order to establish capability of the mechanical joints assembly to withstand internal pressure below atmosphere, similar to the condition likely to be encountered under service conditions, following vacuum test is to be carried out.

Mechanical joint assembly is to be connected to a vacuum pump and subjected to a pressure 300 mbar (22.5 cmHg) absolute. Once this pressure is stabilized the mechanical joint assembly test specimen under test are to be isolated from the vacuum pump and this pressure is to be retained a period of 15 minutes

Pressure is to be monitored during the test.

No internal pressure rise is permitted.

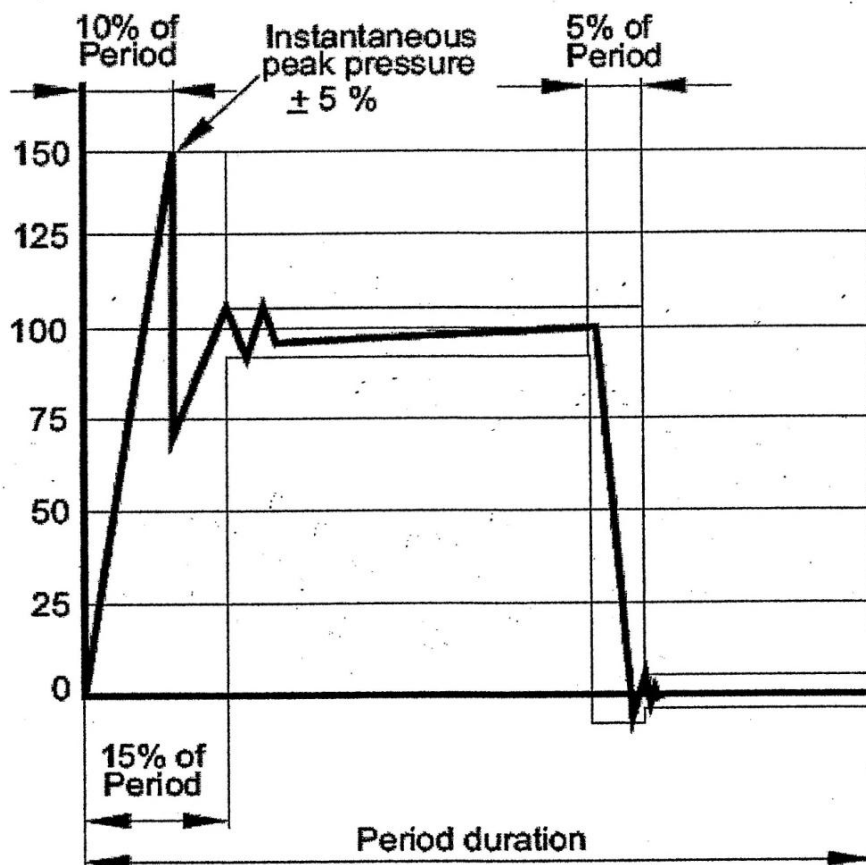
8. Pressure pulsation test

In order to determine capability of mechanical joint assembly to withstand pressure pulsation likely to occur during working conditions, joint assemblies intended for use in rigid connections of pipe lengths, are to be tested in accordance with the following method.

The mechanical joint test specimen for carrying out this test may be the same as that used in the test in Leakage test (Hydraulic pressure) provided it passed that test.

Impulse pressure is to be raised from 0 to 1.5 times the design pressure of the joint with a frequency equal to 30-100 cycles per minute. The number of cycles is not to be less than 5×10^5 .

The mechanical joint is to be examined visually for sign of leakage or damage during the test.



9. Repeated assembly test

Mechanical joint test specimen are to be dismantled and reassembled 10 times in accordance with manufacturers instructions and then subjected to a tightness test as defined in Leakage test (Hydraulic pressure).

2. Test Report

- 1) TIGHTNESS TEST
- 2) PRESSURE PULSATION TEST
- 3) BURST PRESSURE TEST
- 4) PULL-OUT TEST
- 5) FIRE ENDURANCE TEST
- 6) VACUUM TEST
- 7) REPEATED ASSEMBLY TEST
- 8) VIBRATION TEST



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